even greater. The great population density of this small snail indicates that *Gyraulus parvus* plays not an insignificant role in the community of this pond. The ability of this snail to survive during periods of drought is probably augumented by the protective action of a dense dry algal mat which is left on the pond bottom when the pond dries out.

The results of this study demonstrate that *Gyraulus parvus* produces a dense population in this temporary prairie pond; that a high percentage of these snails can survive long periods of drought; that the algae in the pond form a protective mat on the bottom of the pond when it dries out; and that the great amount of moisture in the soil of the dried pond and the protective algal mat provides a favorable environment for the survival of these snails.

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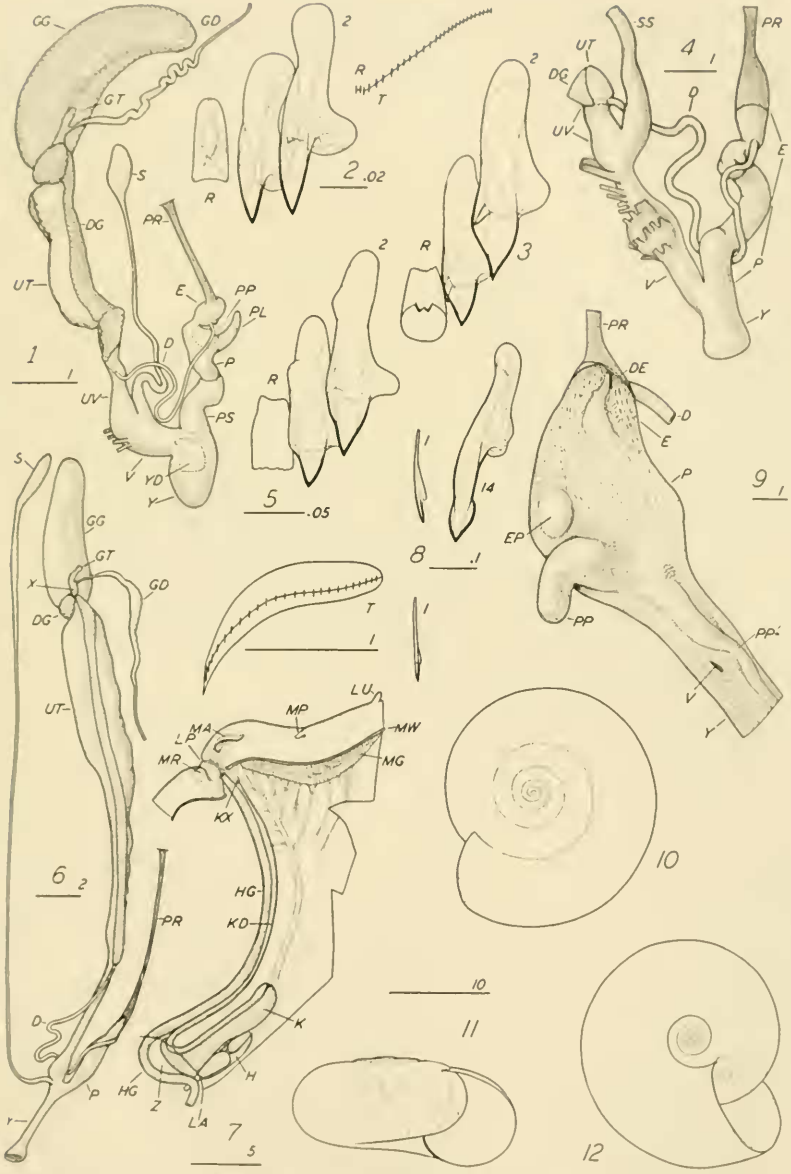
SOME HAPLOTREMATIDAE

BY H. BURRINGTON BAKER

Since 1930 (Proc. A.N.S.P., 82: 307), Drs. W. O. Gregg and G. D. Hanna have kindly sent me the animals of 3 additional species of *Haplotrema* from California, and 2 of *Austroselenites* have been collected in Puerto Rico. In plate 9, the small numbers at the end of each scale indicate their lengths in mm. or fractions. Those abbreviated labels, which are not explained in the text, are defined in Bull. Bishop Museum 158: 92–93 (1938).

Incidentally, in 1930, I retained the term "entocone" for the



Figs. 1–2, *Haplotrema caelatum*. Figs. 3–4, *H. voyanum*. Fig. 5, *H. transfuga*. Figs. 6–7, *Austroselenites concolor*. Figs. 8–12, *A. alticola*.

peculiar and very variable denticle under the principal cusp on some inner radular teeth of *Haplotrema*. But, since the true entocone disappears first in most pulmonates that approach carnivorous dentition, it may actually be the mesocone, which would make the principal cusp an ectocone, homologous with the one that, on the laterals of the Spiraxinae, about equals in size the mesocone, but, in most Oleacinidae, completely disappears. The compounded term "under-cusp" seems self-explanatory and obviates any decision. Because laterals and marginals are rarely differentiated, "centrifugals" is also used, to include all teeth except the centrals.

HAPLOTREMA (GREGGIELLA) CAELATUM (Mazÿck), new subgenus (Plate 9, figs. 1, 2).

The figured animals were collected Dec. 6, 1931, by Dr. W. O. Gregg (for whom the subgenus is named), under willow trees, along Los Angeles River, near Glendale, California.

Animal similar to *H. alameda* but foot lighter; lung with black blotches. Ovotestis (omitted from f. 1) with 7 small, fan-shaped lobes of few clavate alveoli visible, in basal half of apical liver lobe. Epiphallic chamber (E) more constricted at base. Penis (P) with a white diverticulum (PL) and containing a subapical stimulator-papilla (outlined at PP). Atrial stimulator (outlined at YD) quite large; atrial opening not far from inferior tentacle. Radular formula (f. 2): 25 + 1 + 25; 50 rows counted; central without definitely free cusp; vestigial under-cusp on second tooth but absent from all others.

Greggiella, type *H. caelatum*, differs from *Ancomena* in its penial diverticulum, which is reminiscent of *Salasiella* and *Oleacina*, in its simpler radula, and in the heavy and angular, but low riblets on its smaller shell.

HAPLOTREMA (ANCOMENA) TRANSFUGA (W. G. Binney) (Plate 9, fig. 5).

The figured animals were collected April 20, 1940, by Dr. W. O. Gregg, in La Mision Valley, Baja California.

Animal similar to *H. alameda* Pilsbry, H.B.B., 1930: 414. Spermatheeal sac long ellipsoid; free oviduct with slender apical region and more abruptly swollen base. Internal folds of apical

penial chamber more papillate. Radular formula (f. 5): 13 + 6 + 1 + 19; 35 rows counted; central without evident cusp; under-cusps without definitely free points but represented by thickenings on inner 6 teeth, under and apparently fused to undersides of principal cusps.

The divergences in genitalia between *H. transfuga* and *H. alameda* might be due to differences in contraction, but the radular ones seem slightly more important.

Thiele's (1931, Handbuch) reduction of *Ancomena* to the synonymy of his *Proselenites,* although reasonable enough, is nomenclatorially indefensible. Incidentally, the apparent discourtesy of my (1928) valid designation of *H. concavum* as the type of *Proselenites* came about because, at the time, neither Thiele nor I had realized that *Ancomena* (*H. vancouverense*) and *Geomene* (*H. concavum*) were even sectionally distinct.

HAPLOTREMA (ANCOTREMA) VOYANUM (Newcomb) (Plate 9, figs. 3, 4)

The figured animal was collected in June, 1931, by Dr. G. D. Hanna, along a small creek entering Stuarts Fork, Trinity River, ½ mile north of Trinity Alps Camp, Trinity County, California. No embryos have been observed by me.

Animal similar to *H. sportella* (Gould), H.B.B., 1930, Proc. A.N.S.P. 82: 418. Lung with brown spots, sometimes grouped into a vague network. Vagina (V, f. 4) much longer, with muscular collar near middle. Penial retractor (PR; ⅔ omitted) arising partly from diaphragm but connecting with nearby tail fan by muscle strands. Penis (P) internally shows, in apical half, high, papillate folds below entrance of vas deferens; small apical pocket much less sharply demarcated; basal chamber very thick-walled, but with longitudinal folds much weaker towards apex (basally also smooth when everted). Radular formula (f. 3): 12–13 + 8 + 1 + 20–21; 29 rows counted; central with two minute points, visible only on more posterior teeth; under-cusps longer, on inner 8 teeth.

The longer vagina, the shifted origin of the penial retractor and the stronger radular entocones of *H. voyanum* approach the conditions in the section *Ancomena.*

AUSTROSELENITES (ZOPHOS) CONCOLOR (Férussac) (Plate 9, figs. 6, 7). *Z. c.* H.B.B., 1925, Occ. Papers Mus. Zool. Univ.

Mich. 56: 19, radula. *Haplotrema c.* H.B.B., 1920, Proc. A.N.S.P. 82: 422, fragmentary anatomy.

The figured animal was collected Aug. 24–29, 1939, under limestone rocks in rich humus, altitude 0–300 feet, 2 miles south of Cataño, Puerto Rico. It was not pregnant but had apparently been so. This species appears to attain sexual maturity at almost any size; the uterus in some specimens contained as many as 7 large, shell-less eggs, in others embryos.

Sides of foot blue-blackish with white sulci; tentacles dark; tail abruptly pointed. Lung (f. 7) colorless except for black blotches over kidney (K), which has a transverse extension towards hindgut (HG); ureter (KD) complete; mantle-glands (MG) broadly invading. Ovotestis (omitted from f. 6) with 8 lobes, separated by liver tissue, visible in basal $\frac{2}{3}$ of long apical liver lobe. Hermaphroditic duct (GD) swollen. Talon (GT) digitiform with apical white knob; carrefour (X) largely exposed. Uterus (UT) very thin-walled after (and greatly swollen during) pregnancy. Spermathecal sac (S) ellipsoid (often more swollen), imbedded, between stomach and first limb of intestine, to opposite apex of albumen gland (GG). Anterior genitalia very slender. Penis (P) enervated from cerebral ganglion. Pharyngeal retractor separating almost immediately, as heavy as all others combined and enveloping apex of buccal mass; tentacular retractors very soon free; right ommatophoral free from genitalia; inferior tentacular branching off just behind nerve ring; lateral retractors fused to tail fan. Labial lobes not evident. Buccal mass stout and cylindric, almost as long as retracted foot, with heavy protractors, and with oesophageal entrance not much over 0.1 length from anterior end (about 0.4 in *Haplotrema*); oesophagus often greatly swollen anteriad to form a conical crop stouter than and as long as buccal mass; stomach small and little more swollen than upper oesophagus or intestine; second of S-loops (HG, f. 7) short. Salivary glands slender, $\frac{1}{4}$ as long as buccal mass, lying above oesophagus, attached to both body walls by muscles and fused for 0.8 of length; ducts 3 times as long as glands. Cerebral ganglia closely joined but pleural or pedal connectives often 10 times as long as either ganglion; pleural, parietal and visceral ganglia juxtaposed; right parietal and visceral only demareated by shallow groove; buccal ganglia relatively larger than in *Haplotrema*. Jaw fold without evident cornification. Radular formula of large individual: 35 + 0 + 35; 68 rows counted. Formula for 2-whorled embryo: 25 + 0 + 25; teeth relatively somewhat stouter but very similar.

These more complete data on the shape of its kidney, with complete ureter, its more thoroughly vestigial jaw and its much larger radular pouch, as well as the radula, of which the embryonic data seemingly connote ancient fixation, all indicate that *Zophos* is but distantly related to *Haplotrema*. On account of its very similar shell, it is still subordinated to *Austroselenites* Kobelt (1905).

Although well preserved animals of *Haplomena* will be needed for proof, the salivary glands, long kidney and lack of radular central in *A.* (*?*) *paucispira* (Poey) suggest that it also belongs in this genus. The first radular centrifugal of this species has been reëxamined and its "vestigial entocone" is, even when most evident, little more than an angle on the thickened support of the main cusp.

Until new studies of *Haplomena* can be made, the new subfamily, Austroselenitinae, is retained in the Haplotrematidae, although it seems, in some ways, more aberrant than the Rhytidae and similar to the Spiraxinae, as outlined in the following key to agnathomorph families and their American subfamilies:

1. Kidney triangular or longer than broad; penis not armed with thorns and with weak epiphallus; genital talon evident; shell heliciform or depressed, umbilicate and with simple columella; lung with weak minor venation ..... Haplotrematidae.

1a. With kidney and ureteric opening separated from hindgut by posterior angle of lung-wall; S-loops of hindgut large; salivary glands forming a ring around oesophagus; shell-growth discontinuous and peristome thickened or weakly reflected; jaw thin but large; radula with reduced central and with under-cusp represented on some inner centrifugal ..... Haplotrematinae.

1b. With hindgut limb of kidney evident and ureter complete; S-loops much reduced; salivary glands forming lanceolate shield over gullet; shell-growth continuous and peristome sharp; jaw at best vestigial; radula without central and with all centrifugals unicuspid ..... Austroselenitinae.

2. Like 1, with kidney and S-loops (excl. *Schizoglossa?*) like 1a and salivary glands, shell-growth and radula (central various) like 1b, but talon apparently smaller, jaw absent and lung venation like 3a ..... Rhytidae.

3. Like 1, with shell-growth like 1b, but talon vestigial, shell elongate and usually imperforate, columella variously